PATENT CLAIMS

1. A binuclear, oxygen-bridged, bimetallic complex of the general formula I

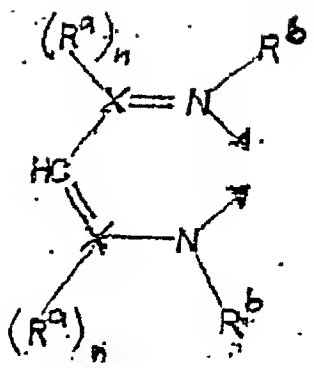
(I) $[(LM^1R^1)\ (Cp_2M^2R^2)]\ (\mu\text{-}O)$

where:
M^1 = Al, Ge, Zr or Ti;
M^2 = Zr, Ti, or Hf;
Cp = cyclopentadienyl;
R^1, R^2 = H; C(1-6) alkyl; halogen; aryl; $SiMe_3$ and alkylaryl with aryl = $C_6H_{5-n}X_n$, and X = halogen, C(1-6) alkyl, aryl, NO_2, SO_3H, NR^3_2, where R^3 = C(1-6) alkyl or H and n = 0 to 5; and
L = a bidentate, doubly heteroatom-coordinated organic chemical ligand, which together with the metal M^1 forms a 5 or 6-membered ring.

2. The bimetallic complex according to Claim 1, characterized in that it is a heterobimetallic complex, preferably where M^1 = aluminum and M^2 = zirconium, more preferably a complex of the form $[(LAlMe)\ (Cp_2ZrR^2)]\ (\mu\text{-}O)$, where R^2 is Me or Cl.

3. The bimetallic complex according to Claim 1 or 2, characterized in that the ligand L has the following composition (formula II):

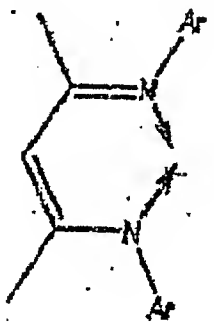
(II) $R^b\text{-}\underline{N}\text{=}X(R^a)_n\text{-}HC\text{=}X(R^a)_n\text{-}\underline{N}\text{-}R^b$,



where: X = C or P;
R^a, R^b = R^1, R^2; n = 1 if X = C; n = 2 if X = P.

4. The bimetallic complex according to Claim 3, characterized in that the ligand L has the following composition:

Ar-N=C(CH_3)-HC=C(CH_3)-N-Ar,



in particular where Ar = 2,6-$iPr_2C_6H_3$.

5. A method for producing a binuclear, oxygen-bridged, bimetallic complex according to one of Claims 1 through 4, characterized in that a precursor complex of the formula $LM^1R^1(OH)$ is reacted with a metallocene precursor complex $Cp_2M^2(R^2)_2$ or $Cp_2M^2MER^2$ or Cp_2M^2HX, where X = halogen, preferably in an inert solvent.

6. A catalyst preparation for the polymerization of olefins, which contains at least one complex according

to one of Claims 1 through 4 and at least one cocatalyst.

7. The catalyst preparation according to Claim 6, characterized in that the cocatalyst is an alkylaluminoxane, preferably methylaluminoxane (MAO).

8. A use of binuclear, oxygen-bridged, bimetallic complexes made of a transition metallocene and an organic aluminum, germanium, zirconium, or titanium compound which does not contain a cyclopentadienyl group, in particular according to one of Claims 1 through 4, as polymerization catalysts.

9. The use according to Claim 8, characterized in that it is at least one heterobimetallic complex.

10. The use according to Claim 8 or 9, characterized in that the catalyst is used in connection with a cocatalyst of the type [MeAlO]x, trialkyl aluminum, or alkylhaloaluminum, in particular with methylaluminoxane (MAO).

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